WE CLAIM:

1. A wavelength selective optical cross-connect device comprising:
   a. a first demultiplexor arranged to demultiplex an incoming signal;
   b. a plurality of individually removeable modules, each module arranged to receive an output of the first demultiplexor and each including at least an optical switch for switching said output of the first demultiplexor.

2. The device of claim 1 further comprising a first multiplexor arranged to receive a respective outgoing signal from said each module of the plurality of individually removeable modules and to provide a multiplexed outgoing signal from the device.

3. The device of claim 2 wherein said each module further includes a respective second multiplexor arranged to pre-multiplex said respective outgoing signal before the first multiplexor.

4. The device of claim 3 wherein said each module further includes a power equalization array arranged to equalize the power of a respective outgoing signal from said each module.

5. The device of claim 1 wherein said each module further includes a respective second demultiplexor arranged to further demultiplexing said output of the first demultiplexor.

6. The device of claim 1 wherein said each module further includes a power equalization array arranged to equalize the power of a respective outgoing signal from said each module.

7. The device of claim 6 wherein said power equalization array is arranged to equalize the power of respective outgoing signal from each said module with

respect to the power of respective outgoing signals other modules of said plurality of modules.

8. The device of claim 6 wherein said power equalization array comprises an amplifier for each of multiple wavelength channels for each module.

9. The device of claim 6 wherein said power equalization array comprises a variable attenuator for each of multiple wavelength channels for each module.

10. The device of claim 1 further comprising an optical protection switch separate from said optical switch.

11. A wavelength selective optical cross-connect device comprising

a. a first demultiplexor arranged to demultiplex an incoming signal;

b. a first multiplexor arranged to provide an outgoing signal; and

c. a plurality of individually removeable modules, each module arranged to receive a respective output of the first demultiplexor and feed a respective output of said module into said first multiplexor, each module including at least (i) a second demultiplexor arranged to further demultiplex the respective output of the first demultiplexor, (ii) a power equalization matrix arranged to equalize the power in channels from the second demultiplexor, and (iii) a second multiplexor arranged to pre-multiplex the channels from the second demultiplexor to form the output of said module.

12. The device of claim 11 further comprising one or more switch fabrics arranged to switch channels within one or more of the modules.

13. The device of claim 12 wherein said one or more switch fabrics are removable from the device and replaceable within the device.

14. The device of claim 13 wherein said one or more switch fabrics include a manual switch fabric with automated connection discovery.

15. The device of claim 14 wherein the manual switch fabric is a patch panel with electrical leads in the fiber patch cords arranged for automated connection discovery.

16. The device of claim 14 wherein said manual switch fabric includes one or more interfaces with the rest of the device that are identical or compatible with an interface employed by a switch fabric having remote or automatic reconfigurability, such that the device is readily upgradeable to a switch fabric having reconfigurability.

17. The device of claim 13 wherein the one or more switch fabrics include two or more switch fabrics separately and individually removeable.

18. The device of claim 13 wherein the one or more switch fabrics include two or more switch fabrics separately and individually upgradeable.

19. The device of claim 13 wherein the one or more switch fabrics include one manually reconfigurable switch fabric and one remotely reconfigurable switch fabric.

20. The device of claim 12 further comprising one or more protection switches separate from said one or more switch fabrics.

21. A wavelength add-drop module device for receiving network management messages or commands from a network management controller transmitted with communications traffic via a fiber connection, the device comprising a tap on the signal from an incoming fiber connection and a receiver arranged to detect signals on the tap.

22. The device of claim 21 further comprising a demultiplexor on the tap before the receiver.

23. The device of claim 21 further comprising a subcarrier modulator for sending device messages to the network management function.

24. The device of claim 23 wherein the subcarrier modulator is positioned and arranged to modulate the signal on optical channel added at the device.

25. A wavelength selective optical cross-connect device for providing ring or network management, the device comprising subcarrier demodulator for receiving messages from one or more wavelength add-drop modules on the associated ring or network, and a transmitter for transmitting messages at a selected wavelength to said modules.

26. The device of claim 25 further comprising a controller for performing monitoring and control functions for the device and for said one or more wavelength add-drop modules.

27. The device of claim 25 further comprising a tap arranged to provide a portion of an incoming signal to the subcarrier demodulator.

28. The device of claim 27 further comprising a demultiplexor arranged to demultiplex the tapped portion of the incoming signal.

29. The device of claim 28 further comprising multiple filters arranged to filter the demulitplexed signals from the tapped portion of the incoming signal.

30. A method of providing for communications for ring or network management in an optical fiber network that is at least in part ring-based, the method comprising:

providing at least one wavelength selective cross-connect on a ring in the network, the cross-connect including a controller or mediation

function and at least one transmitter arranged to transmit on a network communications frequency and a subcarrier demodulator;

providing one or more wavelength add-drop modules connected to said ring and each including a subcarrier modulator for sending signals to said subcarrier demodulator;

sending control messages from the controller to the one or more wavelength add-drop modules via the transmitter on the a network communications frequency;

receiving said control messages from the controller in the one or more wavelength add-drop modules;

sending messages from the one or more wavelength add-drop modules to the controller via subcarrier modulation; and

receiving and decoding said messages from the one or more wavelength add-drop modules via subcarrier demodulation.

31. The method of claim 30 wherein the step of sending messages from the one or more wavelength add-drop modules to the controller via subcarrier modulation comprises modulating a different optical channel with each of said one or more wavelength add-drop modules.

32. The method of claim 30 wherein the step of sending messages from the one or more wavelength add-drop modules to the controller via subcarrier modulation comprises modulating at a different subcarrier frequency at each of said one or more wavelength add-drop modules.

33. The method of claim 32 wherein the step of sending messages from the one or more wavelength add-drop modules to the controller via subcarrier modulation comprises modulating a different optical channel at a different subcarrier frequency with each of said one or more wavelength add-drop modules.

34. The method of claim 30 wherein the step of receiving said control messages from the controller in the one or more wavelength add-drop modules comprises

tapping a portion of the incoming signal at each of said one or more wavelength add-drop modules.

35. The method of claim 34 wherein the step of receiving said control messages from the controller in the one or more wavelength add-drop modules further comprises demultiplexing the network communications frequency from the tapped portion of the incoming signal.

36. The method of claim 30 wherein the step of receiving said control messages from the controller in the one or more wavelength add-drop modules comprises detecting logically instructions that are directed to a receiving one of the one or more wavelength add-drop modules and processing said instructions.

37. The method of claim 30 wherein the step of receiving and decoding said messages from the one or more wavelength add-drop modules via subcarrier demodulation includes using a digital signal processor to separate and decode the messages.

38. A wavelength selective optical cross-connect device comprising:
a pair of wavelength-layered cross-connect switch fabrics, the pair of fabrics being connectively surrounded by one-by-two switches so arranged as to be able to switch any input or output associated with the fabrics from one of the pair of fabrics to the other of the pair of fabrics to a provide protection switching function, while the fabrics are arranged provide path switching function.

39. A method of providing protection switching and path switching in a wavelength selective optical cross-connect device, the method comprising:
employing one-by-two switches to selectively connect input and output wavelength channels to either of two wavelength-layered cross-connect fabrics to provide a protection switching function; and

employing said two wavelength-layered cross-connect fabrics to provide a path switching function.

40. A wavelength selective cross-connect device for interconnecting two or more fiber rings, the device comprising a first optical switch arranged and positioned so as to be able to selectively connect a first loop of a first ring to either a first loop of a second ring or a second loop of the second ring; and a second optical switch arranged and positioned so as to be able to selectively connect a second loop of the first ring to either the first loop of the second ring or the second loop of the second ring.

41. The device of claim 40 wherein the first and second optical switches are one-by-two optical switches.

42. A wavelength selective optical cross-connect device comprising an input signal path including, in order, a wide band amplifier, a first demultiplexor, and a plurality of narrow band amplifiers arranged in parallel.

43. The device of claim 42 further comprising respective second demultiplexors following said narrow band amplifiers.